

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
540 S. MORRIS AVE., MONTGOMERY, AL 36115
RA226 ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #1100246

Project: Dimock Residential GW Site, Dimock, PA
Analysis method: Radium-226 in Water: Rapid Method for High-Activity Samples
Report ID: 1100246-RA226
Report type: Original
Date reported: 04/03/2012
Total pages in report: 30

SAMPLES

NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
B2.01498T	EB02	PA:DIMOCK	WATER-DRINKING	02/05/2012	02/07/2012
B2.01499U	HW45	PA:DIMOCK	WATER-DRINKING	02/06/2012	02/07/2012
B2.01510V	FB11	PA:DIMOCK	WATER-DRINKING	02/06/2012	02/08/2012
B2.01511W	HW30	PA:DIMOCK	WATER-DRINKING	02/06/2012	02/08/2012
B2.01513Y	HW31	PA:DIMOCK	WATER-DRINKING	02/06/2012	02/08/2012
B2.01514Z	HW43	PA:DIMOCK	WATER-DRINKING	02/06/2012	02/08/2012
B2.01515A	HW15A	PA:DIMOCK	WATER-DRINKING	02/07/2012	02/08/2012
B2.01518D	HW31Z	PA:DIMOCK	WATER-DRINKING	02/06/2012	02/08/2012
B2.01571J	HW47	PA:DIMOCK	WATER-DRINKING	02/08/2012	02/09/2012
B2.01572K	FB12	PA:DIMOCK	WATER-DRINKING	02/07/2012	02/09/2012
B2.01573L	FB13	PA:DIMOCK	WATER-DRINKING	02/08/2012	02/09/2012
B2.01574M	HW38	PA:DIMOCK	WATER-DRINKING	02/08/2012	02/09/2012
B2.01575N	HW51	PA:DIMOCK	WATER-DRINKING	02/07/2012	02/09/2012
B2.01623D	HW21	PA:DIMOCK	WATER-DRINKING	02/09/2012	02/10/2012
B2.01624E	HW23	PA:DIMOCK	WATER-DRINKING	02/08/2012	02/10/2012
B2.01625F	HW48	PA:DIMOCK	WATER-DRINKING	02/08/2012	02/10/2012
B2.01626G	HW48Z	PA:DIMOCK	WATER-DRINKING	02/08/2012	02/10/2012
B2.01728M	FB15	PA:DIMOCK	WATER-DRINKING	02/10/2012	02/13/2012
B2.01729N	HW16	PA:DIMOCK	WATER-DRINKING	02/10/2012	02/13/2012
B2.01730F	HW16Z	PA:DIMOCK	WATER-DRINKING	02/10/2012	02/13/2012

EXCEPTIONS

- Packaging and shipping**—No problems were observed.
- Documentation**— NAREL originally agreed to analyze 71 samples for this project, but sample collectors collected and shipped more samples than expected. NAREL then agreed to analyze 100 samples, which would make five batches of 20 for QC purposes. Actually 101 samples were received. With the client's permission, NAREL did not analyze the field blank received in the last shipment thus making the agreed upon total of 100 samples for analysis.
- Sample preparation**—No problems were encountered.
- Analysis**— During counting, samples B2.01729 and B2.01730 had peaks that shifted from their normal region-of-interest (ROI) due to attenuation. The ROIs were manually adjusted, and the results are reported in this data package.
- Holding times**—No holding times were specified.

QUALITY CONTROL

1. **QC samples**—All QC analysis results met NAREL acceptance criteria.
2. **Yields**—All chemical yields were within acceptance limits.
3. **Instruments**—Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.


CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.



Mary F. Wisdom
Quality Assurance Manager, NAREL

4-10-12
Date



John G. Griggs, Ph.D.
Director, Center for Environmental Radioanalytical
Laboratory Science

4-11-12
Date

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

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SDG #1100246

ANALYSIS SUMMARY

Analysis Procedure: NAREL RA226-EICHRON
Title: Radium-226 in Water: Rapid Method for High-Activity Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
B2.01498T	DUP	N/A	03/22/2012	0015829T	0008551D
B2.01499U		N/A	03/22/2012	0015829T	0008551D
B2.01510V		N/A	03/22/2012	0015829T	0008551D
B2.01511W		N/A	03/22/2012	0015829T	0008551D
B2.01513Y		N/A	03/22/2012	0015829T	0008551D
B2.01514Z		N/A	03/22/2012	0015829T	0008551D
B2.01515A		N/A	03/22/2012	0015829T	0008551D
B2.01518D		N/A	03/23/2012	0015832M	0008551D
B2.01571J		N/A	03/23/2012	0015832M	0008551D
B2.01572K		N/A	03/23/2012	0015832M	0008551D
B2.01573L		N/A	03/23/2012	0015832M	0008551D
B2.01574M		N/A	03/23/2012	0015832M	0008551D
B2.01574M		N/A	03/23/2012	0015832M	0008551D
B2.01575N		N/A	03/23/2012	0015832M	0008551D
B2.01623D		N/A	03/23/2012	0015832M	0008551D
B2.01624E		N/A	03/24/2012	0015837T	0008551D
B2.01625F		N/A	03/24/2012	0015837T	0008551D
B2.01626G		N/A	03/24/2012	0015837T	0008551D
B2.01728M		N/A	03/24/2012	0015837T	0008551D
B2.01729N		N/A	03/24/2012	0015837T	0008551D
B2.01730F		N/A	03/24/2012	0015837T	0008551D
LCS-00633888W *	LCS	N/A	03/24/2012	0015837T	0008551D
RBK-00633887V *	RBK	N/A	03/22/2012	0015829T	0008551D

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title

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SAMPLE ANALYSIS REPORT

Sample #:	B2.01498T	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015829T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/21/2012 17:10	1000.0	AS34	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.61e-02	6.0e-02	1.2e-01	PCI/L	03/20/2012 12:16 CDT

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SAMPLE ANALYSIS REPORT

Sample #:	B2.01499U	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015829T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/21/2012 17:10	1000.0	AS35	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.17e-01	1.3e-01	1.1e-01	PCI/L	03/20/2012 12:20 CDT

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SAMPLE ANALYSIS REPORT

Sample #:	B2.01510V	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015829T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/21/2012 17:10	1000.0	AS36	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	7.95e-02	8.7e-02	1.1e-01	PCI/L	03/20/2012 12:17 CDT

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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01511W	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015829T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHR
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/21/2012 17:10	1000.0	AS37	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	8.88e-02	9.0e-02	1.1e-01	PCI/L	03/20/2012 12:26 CDT

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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01513Y	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015829T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/21/2012 17:10	1000.0	AS39	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	7.78e-01	2.3e-01	6.6e-02	PCI/L	03/20/2012 12:37 CDT

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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01514Z	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015829T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/21/2012 17:10	1000.0	AS40	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.26e-01	1.0e-01	1.1e-01	PCI/L	03/20/2012 12:39 CDT

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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01515A	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015829T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/21/2012 17:10	1000.0	AS43	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	4.57e-01	1.8e-01	9.1e-02	PCI/L	03/20/2012 12:27 CDT

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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01518D	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015832M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/22/2012 13:34	1000.0	AS34	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	7.56e-01	2.3e-01	1.2e-01	PCI/L	03/21/2012 11:50 CDT

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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01571J	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015832M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/22/2012 13:34	1000.0	AS35	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	5.05e-01	1.9e-01	1.1e-01	PCI/L	03/21/2012 11:48 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01572K	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015832M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/22/2012 13:34	1000.0	AS36	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	7.91e-02	8.7e-02	1.1e-01	PCI/L	03/21/2012 11:38 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01573L	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015832M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/22/2012 13:34	1000.0	AS37	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	5.41e-03	5.0e-02	1.1e-01	PCI/L	03/21/2012 11:41 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01574M	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015832M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/22/2012 13:34	1000.0	AS39	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.22e-01	9.2e-02	6.6e-02	PCI/L	03/21/2012 11:51 CDT

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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01574M	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015832M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/22/2012 13:34	1000.0	AS40	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.11e-01	9.8e-02	1.1e-01	PCI/L	03/21/2012 11:43 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01575N	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015832M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/22/2012 13:34	1000.0	AS43	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.35e-01	1.1e-01	1.0e-01	PCI/L	03/21/2012 12:10 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01623D	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015832M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-BICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/22/2012 13:34	1000.0	AS44	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.13e-01	9.3e-02	7.0e-02	PCI/L	03/21/2012 11:53 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01624E	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015837T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2012 13:55	1000.0	AS81	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.15e-01	9.4e-02	7.1e-02	PCI/L	03/22/2012 12:35 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01625F	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015837T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2012 13:55	1000.0	AS82	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	8.05e-02	8.8e-02	1.2e-01	PCI/L	03/22/2012 12:33 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01626G	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015837T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2012 13:55	1000.0	AS83	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	7.65e-02	7.6e-02	6.6e-02	PCI/L	03/22/2012 12:25 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01728M	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015837T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2012 13:55	1000.0	AS84	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	5.74e-02	7.2e-02	9.0e-02	PCI/L	03/22/2012 12:17 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01729N	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015837T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHR
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2012 13:55	1000.0	AS85	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226 *	2.66e+00	4.8e-01	1.1e-01	PCI/L	03/22/2012 12:34 CDT

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	B2.01730F	QC batch #:	0008551D
Matrix:	WATER-DRINKING	Assay batch #:	0015837T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2012 13:55	1000.0	AS86	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226 *	2.98e+00	5.2e-01	1.1e-01	PCI/L	03/22/2012 12:42 CDT

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00633888W	QC batch #:	0008551D
Matrix:	N/A	Assay batch #:	0015837T
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL RA226-EICHIRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2012 13:55	1000.0	AS87	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	3.22e+00	3.5e-01	2.3e-02	PCI	03/22/2012 12:26 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100246

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00633887V	QC batch #:	0008551D
Matrix:	N/A	Assay batch #:	0015829T
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/21/2012 17:10	1000.0	AS44	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	9.65e-03	1.3e-02	1.4e-02	PCI	03/20/2012 12:21 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 1100246

QC BATCH SUMMARY

QC batch #: 0008551D
Preparation procedure: N/A
Analysis procedure: NAREL RA226-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
B2.01498T	DUP	84.54 %	7.04 %	PH
B2.01499U		86.51 %	7.24 %	PH
B2.01510V		85.52 %	7.09 %	PH
B2.01511W		85.38 %	7.20 %	PH
B2.01513Y		87.72 %	7.20 %	PH
B2.01514Z		86.21 %	7.14 %	PH
B2.01515A		88.10 %	7.33 %	PH
B2.01518D		84.73 %	7.35 %	PH
B2.01571J		87.52 %	7.60 %	PH
B2.01572K		85.97 %	7.40 %	PH
B2.01573L		87.61 %	7.62 %	PH
B2.01574M		88.08 %	7.50 %	PH
B2.01574M		85.63 %	7.38 %	PH
B2.01575N		79.85 %	7.17 %	PH
B2.01623D		88.06 %	7.67 %	PH
B2.01624E		86.43 %	7.71 %	PH
B2.01625F		89.04 %	7.89 %	PH
B2.01626G		93.55 %	8.14 %	PH
B2.01728M		91.84 %	8.04 %	PH
B2.01729N		87.12 %	7.86 %	PH
B2.01730F		88.06 %	7.95 %	PH
LCS-00633888W *	LCS	82.04 %	7.48 %	PH
RBK-00633887V *	RBK	88.70 %	7.40 %	PH

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**National Air and Radiation Environmental Laboratory
QC Batch Report**

QC Batch #: 0008551D

Analytical Method: NAREL RA226-EICHROM

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date	Flags
00633887V	RA226	$9.65e-03 \pm 1.3e-02$	2012-03-20	OK

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
B2.01574M	RA226	$1.22e-01 \pm 9.2e-02$	$1.11e-01 \pm 9.8e-02$	9.34	-0.16 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00633888W	RA226	$3.37e+00 \pm 3.4\%$	$3.22e+00 \pm 3.5e-01$	95.80	-0.77 OK

Analyst:

Pt Honsa
Honsa, Patricia

30 Mar 2012

QA Officer:

Karl J. McLean

3/30/12

Method Blanks

Analyte: RA226

Method: NAREL RA226-EICHRON

Analyst: Honsa, Patricia

21 301W 2012

Report: 1100246-RA226

